Autoimmune myasthenia gravis after sternal fracture

Petersen, J A ; Jung, H H ; Weller, M ; Linnebank, M

Abstract: We report a 54-year-old woman who suffered a commotio cerebri, whiplash injury and a chest trauma with sternal fracture due to a high-velocity car accident. Two months later, she developed unilateral ptosis and blurred vision, which worsened during the day. Multiple diagnoses were suggested, ranging from thoracic outlet syndrome towards depression. Symptoms persisted and five years later, the patient consulted a neurologist. Laboratory analysis revealed significantly elevated levels of antibodies to acetylcholine receptors, and the diagnosis of myasthenia gravis was made. Speculatively, the damage of retrosternal thymic remnants due to a sternal fracture might have precipitated the condition or exacerbated subclinical disease.

DOI: https://doi.org/10.1159/000335992

Originally published at:
Petersen, J A; Jung, H H; Weller, M; Linnebank, M (2012). Autoimmune myasthenia gravis after sternal fracture. Case Reports in Neurology, 4(1):20-22.
DOI: https://doi.org/10.1159/000335992

Case Reports in Neurology

Case Rep Neurol 2012;4:20–22
DOI: 10.1159/000335992

Published online:
January 20, 2012

ISSN 1662–680X
www.karger.com/crn

Autoimmune Myasthenia Gravis after Sternal Fracture

Jens A. Petersen Hans H. Jung Michael Weller
Michael Linnebank

Department of Neurology, University Hospital Zurich, Zurich, Switzerland

Key Words
Autoimmune diseases · Myasthenia · Trauma

Abstract
We report a 54-year-old woman who suffered a commotio cerebri, whiplash injury and a chest trauma with sternal fracture due to a high-velocity car accident. Two months later, she developed unilateral ptosis and blurred vision, which worsened during the day. Multiple diagnoses were suggested, ranging from thoracic outlet syndrome towards depression. Symptoms persisted and five years later, the patient consulted a neurologist. Laboratory analysis revealed significantly elevated levels of antibodies to acetylcholine receptors, and the diagnosis of myasthenia gravis was made. Speculatively, the damage of retrosternal thymic remnants due to a sternal fracture might have precipitated the condition or exacerbated subclinical disease.

Autoimmune myasthenia gravis (MG) is a heterogeneous disorder with regard to age at onset, thymic changes and distribution of muscle weakness. It is the most common disorder of neuromuscular transmission, most often caused by autoantibodies to the nicotinic acetylcholine receptor (AChR), which is located at the postsynaptic region of the neuromuscular junction. Impairment of these receptors leads to a defect in neuromuscular transmission with muscle weakness and fatigue. The thymus gland plays a role in MG etiology, since hyperplasia of the thymus is frequently observed in patients suffering from MG, and often patients respond well to thymectomy.

We report a 54-year-old woman who suffered a commotio cerebri, whiplash injury and a chest trauma with sternal fracture due to a high-velocity car accident (fig. 1). Two months later, she developed unilateral ptosis and blurred vision, which worsened during the day. MRI of the cranium was normal. In the next months, she developed fatigue. Multiple diagnoses were suggested, ranging from thoracic outlet syndrome towards depression. Symptoms persisted.

Five years after the accident, the patient consulted a neurologist. The patient did not take antiarrhythmic agents or other drugs that may impair muscular strength, and she did not suffer from any thyroid or other autoimmune disorders. She had no family

Dr. J.A. Petersen

Department of Neurology, University Hospital Zurich
Frauenklinikstrasse 26
CH–8091 Zurich (Switzerland)
Tel. +41 44 255 1111, E-Mail jens.petersen@usz.ch

Case Rep Neurol 2012;4:20–22
DOI: 10.1159/000335992
Published online: January 20, 2012

ISSN 1662–680X
www.karger.com/crn

history of neuromuscular or autoimmune diseases. Laboratory analysis revealed significantly elevated levels of antibodies to acetylcholine receptors (anti-AChR; 15.7 nmol/l, normal <0.5), which are diagnostic for MG [1]. Antibodies to titin and muscle-specific receptor tyrosine kinase (MuSK) were negative. Repetitive nerve stimulation revealed no pathological decrement of the compound muscle action potential. No thymoma was found in CT scan. Based on the clinical manifestations and these findings, the diagnosis of ocular myasthenia was made. A treatment with pyridostigmine was initiated that reduced the ocular symptoms. Further on, she developed fluctuating weakness of the arms and the legs, indicating a generalization of myasthenic symptoms. Two infusions of immunglobulins, and thereafter, treatment with steroids and azathioprine improved muscular strength without apparent residual motor impairment, although half a year later, she still reported fluctuating swallowing difficulties, dysarthria and double vision.

When symptoms such as blurred or double vision, fluctuating weakness and fatigue occur within a few weeks after sternal fracture, it should be realized that a patient might have developed MG. Speculatively, the damage of retrosternal thymic remnants due to a sternal fracture might induce an impairment of the blood-thymus-barrier, leading to an autoimmune response to thymic acetylcholine receptor molecules. The thymus contains muscle-like cells, called myoid cells, which express whole AChR molecules [2]. Release of thymic AChR could increase an existing subclinical antibody response, or allow AChR to be presented de novo to the immune system. The AChR is highly immunogenic; for instance, in mice, intraperitoneal injection of purified murine AChR without adjuvants can result in the typical antibodies and clinical expression of the disease [3]. MG was described following minor trauma to the chest and neck in a previously asymptomatic man [4] and similar mechanisms have been proposed for the occurrence of autoimmune myasthenia gravis due to damage of thymic remnants in cardiac surgery [5, 6]. However, in one prospective study with 50 patients, the causal relationship between sternotomy and the emergence of myasthenia gravis could not be proven since autoantibodies against the acetylcholine receptor did not occur within six weeks after cardiac surgery [7].

The presentation of MG after a sternal fracture may be purely coincidental but, because of the short delay between accident and presentation, it is difficult to escape the conclusion that the sternal fracture precipitated the condition or exacerbated subclinical disease. The knowledge about such putative associations may be helpful for diagnostic procedures and may be relevant from a medicolegal perspective.

Disclosure Statement/Funding

J.A.P. and H.H.J. report no disclosure.

M.W. discloses honoraria for lectures and advisory board participation from Merck Serono, Roche and Schering Plough.

M.L. is or was funded by Bayer, Biogen, Merck, Novartis, Teva, the Center for Clinical Sciences of the University Hospital of Zurich, the European Research Foundation and the Koetser Foundation Zurich.

Case Rep Neurol 2012;4:20–22
DOI: 10.1159/000335992
Published online: January 20, 2012

ISSN 1662–680X
www.karger.com/crn

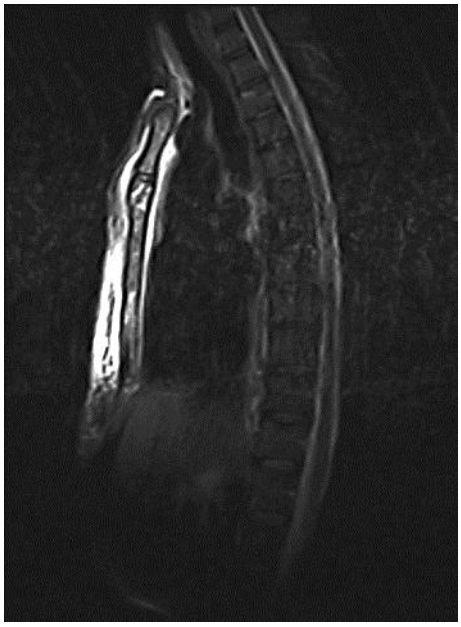

Fig. 1. Sternal fracture. A sagittal T2 MRI of the patient's sternum acquired three days after the car accident.

References

1 Vincent A, Palace J, Hilton-Jones D: Myasthenia gravis. Lancet 2001;357:2122–2128.

2 Schluep M, Willcox N, Vincent A, Dhoot GK, Newsom-Davis J: Acetylcholine receptors in human thymic myoid cells in situ: an immunohistological study. Ann Neurol 1987;22:212–222.

3 Jermy A, Beeson D, Vincent A: Pathogenic autoimmunity to affinity-purified mouse acetylcholine receptor induced without adjuvant in BALB/c mice. Eur J Immunol 1993;23:973–976.

4 Lane R, Wade J, McGonagle D: Myasthenia gravis precipitated by trauma: latent myasthenia and the concept of 'threshold'. Neuromuscul Disord 2009;19:773–775.

5 Resatoglu AG, Tok M, Yemisci M, Yener N, Yener A: Autoimmune myasthenia gravis after coronary artery bypass surgery. Ann Thorac Surg 2006;81:725–726.

6 Scoppetta C, Onorati P, Eusebi F, Fini M, Evoli A, Vincent A: Autoimmune myasthenia gravis after cardiac surgery. J Neurol Neurosurg Psychiatry 2003;74:392–393.

7 Sleeman K, Rajani R, Chambers J, Vincent A: Autoimmune neurological disease after cardiac surgery. J Neurol Neurosurg Psychiatry 2004;75:1078–1079.